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Comments:

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2. Throughout this report, read Professor Chevchenko as Professor N.A. Shevchenko, Savenyagin as Lt. General Avraamiy Pavlovich Zavenyagen, Pevsner as Pevzner, Vanikov as Vannikov, Emilvanov as Yemelyanov, Antropov as Petr Yakovlevich Antropov, Slavski as Slavskiy, Sunghul as Sungul, and Volski as Volskiy.

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3. Professor Starik is probably Professor I.E. Starik, and Sedemko is possibly Sedenko.

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4. Reference paragraph 2, the First and Second Chief Directorates were attached to the Council of Ministers of the USSR.

DOE review completed.

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REMARKS

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1. The Production of UO_2

In late January 1946, Antropov (fnu) (phonetic spelling) ordered [redacted] to start uranium dioxide (UO_2) production as soon as possible. At this time, the new purification and reduction methods were not yet known [redacted] and the construction of the old-type equipment met with difficulties. Antropov said the following: "If you people are not capable of producing uranium metal, you should at least be able to produce uranium dioxide on short order". A quantity of 0.5 ton of of UO_2 was requested.

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The necessary production facilities were hurriedly set up with the support of the Soviet director. The available pure U_3O_8 was reduced at high temperatures by the use of hydrogen. The entire procedure was handled by German operators who worked round the clock. After a method developed by plant director Nestruyev, the UO_2 obtained was pressed into tennis-ball sized balls. It was believed that this UO_2 was delivered to Kuchatov for graphite measuring purposes. In early 1946, the Soviets were repeatedly heard saying that Soviet graphite was superior in quality to American graphite.

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2. Fundamental Thorium Research

Between early 1947 and early 1948 and parallel to their work in the uranium field, [redacted] Thieme were ordered to draw up a thorium purification project. Since at this period their essential mission of producing pure uranium metal had developed to industrial scale, the purpose of this new mission was obviously to keep them busy. The objective was the derivation of pure thorium metal. In earlier days, Degussa and the Auer Company had played a leading role in this field and Thieme had gathered useful experience during his employment

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at the Auer Company. [redacted] Thieme worked on the basis of monazite sand, the method of manufacture being the van Arkel method. In early 1948, [redacted] lecture dealing with this project to the Technical Council at the MVD 1st Chief Directorate. [redacted] audience took very little interest and it may be concluded that the Soviets' general interest in this field was very small. A thorium metal producing plant was said to exist in Podolsk. No details on its capacity, its operating time and material procurement matters are available. Thorium research was said to be supervised by the MVD 2nd Chief Directorate. Production plants are allegedly supervised by the Ministry for Nonferrous Metals. 25X1 25X1 25X1

3. In early 1947, [redacted] ordered to take up research in the fields of U_{235} and Pu (plutonium) production. [redacted] outline a plan on how to avoid losses and cut out impurities in the final product. A new building was to be erected for this purpose, one portion of which was to house a department for the purification and manufacture of Pu metal from Pu material separated from U rods. In the other portion of the building, enriched U was to be purified and processed into enriched U metal. The technical planning of the new building was [redacted] was completed and submitted in early 1948. [redacted] received the mission of carrying out this study on an experimental basis. This mission kept him in Obninskoye until early 1950. 25X1 25X1 25X1 25X1

a. Plutonium

Soviet interest in [redacted] plutonium work declined rapidly and ceased altogether before his work had reached the experimental stage. Obviously the Soviets had in the meantime developed their own procedure. It is believed that the problem of producing plutonium has been solved by the Soviets as early as 1947 and that a pilot plant had been constructed. No information on the location of this pilot plant was available. On the basis of their experiences gained at the pilot plant, the Soviets are believed to have started industrial production of plutonium in late 1949. 25X1

The following details on Soviet plutonium production were furnished: A conversation between professor Chevchenko, chief of the MVD Laboratory 9 (also designated NII 9), and professor Starik, director of the Leningrad Radium Institute, revealed that both these installations have performed research and development work on the fabrication of pure plutonium from irradiated rods.

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Between late 1947 and early 1948, Riehl [redacted] conversation at NII 9 with a Soviet scientist (his name was not remembered) who was engaged in projecting work for a plant designed for the separation of plutonium from irradiated uranium rods. This man was a member of the Leningrad State Planning Bureau No 11 which cooperated with the Leningrad Radium Institute. At the projected plant, uranium rods were to be dissolved in nitric acid and separation 25X1

of plutonium from uranium and fission elements was to be accomplished in three consecutive acetate precipitations and subsequent co-precipitation along with a carrier precipitate, thereby making use of the different properties of the 4th and 6th oxidation stages of plutonium. Lanthanum was to be used as carrier precipitate. The construction plan did not offer any clue as to the future location of the plant. It is assumed, that the Techa area in the region of Chelyabinsk was chosen.

Apparently the then-available plutonium production method did not work satisfactorily. The acetate precipitation process was highly complicated. Judging by a statement of professor Starik's, the Soviets succeeded in developing a more satisfactory method in 1951. Starik visited Sunghul in 1951 (in 1950, 25X1 the Sunghul institute also engaged in 25X1 plutonium problems) and suggested that they should no longer tackle this probelm since a number of new procedures had been developed in the meantime, two of which had proved very successful. 25X1

b. Uranium 235 (U_{235}) and Uranium Hexafluoride (UF_6)

In early 1948, 25X1 conduct experimental work on UF_6 hydrolysis as well as on the chemical purification and reduction of U_{235} metal. Cooperating with Thieme, his work was limited to certain aspects of the chemical purification procedure. It was known that the available UF_6 was enriched material from the cascade process and it was suspected of containing considerable amounts of nickel impurities.

The chemical purification of U_{235} was performed with the use of the ether purification method. At their laboratory at Plant 12, Thieme constructed an experimental apparatus which 25X1 operated satsifactorily with a model substance (Modellsubstanz).

Hydrolysis and reduction problems lay exclusively in the hands of Soviets working at NII 9. The name of the directing chief could not be determined. Reduction work was supervised by professor Volski (fnu) (phonetic spelling).

Parallel to Soviet work on the different problems, the same projects were assigned to the German experts. According to Sevenyagin, the Germans were expected to do better and quicker work.

In mid-1949, the laboratory purification facilities were to be expanded to pilot plant proportions with a ten fold capacity. A new building of Plant 12 was assigned to this project and 25X1 Thieme installed their purification facilities in this building, 25X1 which was to house the entire pilot plant including the hydrolysis and reduction departments. equipment worked satisfactorily 25X1 with a model substance.

[redacted] 25X1

 [redacted] 25X1

In late 1949, the first containers with enriched UF_6 arrived. With a large group of Moscow representatives present, the first experiment was conducted by Emilyanov who himself kept the record. The following stages were carried out consecutively: hydrolysis, purification, and reduction. Germans had no access to the hydrolysis and reduction sections of the building. All construction work had been performed by Soviet personnel and only Soviet operators were employed. Hydrolysis of UF_6 (uranium hexafluoride) to UF_4 (uranium tetrafluoride) was accomplished with the use of distilled water. In the subsequent purification process, UF_4 was converted into uranyl nitrate which was subjected to the other extraction method. In the subsequent reduction process, the purified uranyl nitrate was converted into uranium tetrachloride which was then reduced with calcium or sodium. Two experiments were conducted, each of them for the duration of one week. [redacted] Thieme were permitted to witness the hydrolysis and the reduction process. A fresh quantity of UF_6 was made available for the second experiment. The total quantity of UF_6 processed amounted to some 500 grams. Data on the degree of enrichment of the UF_6 are not available. The Soviets appeared discontented and were heard saying: "the UF_6 is not yet very good." 25X1 25X1 25X1

For some time after termination of these experiments, no activities were observed at the building housing the pilot plant. Shortly afterwards they were, however, resumed by the Soviets. German personnel had no access. 25X1

Several days after completion of the experiments, [redacted] NII 9 [redacted] ordered to examine a constructional design for a U_{235} metal-producing plant. [redacted] had submitted his own theoretical study on such a project with special consideration of how to avoid losses. The design submitted to him had been drawn up by Sedemko (fnu) (phonetic spelling) who had, however, accepted only very few [redacted] suggestions. The building as well as the required facilities for U_{235} production were discussed. [redacted] 25X1 25X1 25X1 25X1 25X1

[redacted] 25X1

[redacted] the designs for the U_{235} and Pu producing plants had been drawn up by Sedemko. It could not be determined where these plants were to be located. Both of them are believed to be located in the Techi area. The UF_6 was enriched by diffusion in the cascade. The location of the diffusion plant could not be determined. In 1952, it was learned that a committee consisting of professor Hertz, Dr. Thieme, Dr. Schuetze, and Dr. Barwich had undertaken a trip to "Kefir Town" in this matter at an undetermined date prior to 1950. "Kefir Town" is a cover name and it is only known that Vanikov owned a villa there. 25X1

In April 1953, Savenyagin [redacted] purification method could be dispensed with since no nickel impurities were noted in the enrichment process. He stated that only hydrolysis and the chemical conversion into uranium tetrachloride as well as the further reduction into uranium metal were required. 25X1

In summary, the following may be stated:

(1) After delivery of the first UF_6 in late 1949, an isotope separation plant was put into operation. The degree of enrichment obtained at this period was, however, unsatisfactory.

(2) By late 1949, the enriched UF_6-processing pilot plant had been completed.

(3) Based on the results obtained at the pilot plant, a new large-scale installation ten times the size of the pilot plant was set up. It may be assumed that the production of U_{235} started in 1951 at the earliest.

3. Uranium Piles

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(1) In 1946, Savenyagin visited the 1st Chief Directorate and took part in a discussion between Pevsner, a co-worker of Kuchatov's, on uranium metal requirements. Savenyagin brought an end to the discussion by reproaching Pevsner for exacting too much from the team. Pevsher replied: "We have set our minds on excelling the American pile." By this time, the Plant 12 pilot plant was already in operation and it may be concluded that Pevsner had already performed measurements of U_{235} metal produced by this plant. Pevsner was employed at the Moscow Laboratory 2 which was engaged in pile problems.

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(2) According to Golovanov, Slavski (fnu) (phonetic spelling), who had been Vanikov's deputy but who has no scientific background, was sent as a pile director to the Ural region in 1947.

(3) During a conversation in 1946, Savenyagin dropped a hint indicating that the Soviets were constructing a pile. Probably this hint was meant to arouse interest in the project.

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(4) The first "pile soup" arrived at the Sunghul institute in March 1950. "Pile soup" is a kind of pulp containing radioactive fission elements obtained in the plutonium production process.

(5) In early 1951, Antropov (fnu) (phonetic spelling) stated: "The samovar has been boiling at a rate of 40 tons. Some 100 tons are to be reached!" no special significance is to be attached to this remark since the Soviets may be assumed to have operated their first pile as early as mid-1948.

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German scientists are not known to have participated in the pile project. For this reason, it will be almost impossible to gain any substantial information on Soviet progress in pile projects. It may be assumed that the first Soviet uranium-operated pile went into operation in mid-1948 and that by 1955, three or four more piles were set up in different places. No exact information regarding their location or number could be obtained. Some indications point to a pile "in the Ural Mts at a lakeside", and another one is suspected to exist near Techi in the Chelyabinsk region. The Techi area is said to be sparsely settled and densily wooded.

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Note. in the Techi area, large stretches of restricted terrain exist there.

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